HAWAII ADMINISTRATIVE RULES

TITLE 12 DEPARTMENT OF LABOR AND INDUSTRIAL RELATIONS

SUBTITLE 8

DIVISION OF OCCUPATIONAL SAFETY AND HEALTH

CHAPTER 235

EXISTING INCLINED TUNNEL LIFTS

Historical Note: Chapter 235 of title 12 is based on chapter 368A of the Hawaii Occupational Safety and Health Standards, Rules and Regulations. [Eff. 7/11/74; am 12/30/76; am 8/11/78; R 12/19/83]

§12-235-1 Application. This chapter shall apply to the operation, maintenance, alteration, and inspection of existing inclined tunnel lifts installed prior to June 11, 1974 which utilize drum machines and are used exclusively for access to underground water pumping facilities for maintenance and repair purposes. Installations after June 11, 1974 shall comply with chapter 12-234. [Eff. 12/19/83; comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-235-2 Definitions.

"Automatic inclined tunnel lift" means an existing inclined tunnel lift which does not require an operator at the hoisting machine;

"Inspector" means an employee of the department qualified in accordance with section 12-210-7;

"Manually operated inclined tunnel lift" means an existing inclined

tunnel lift which requires an operator stationed at the hoisting machine. [Eff. 12/19/83; am and comp 12/6/90] (Auth: HRS §397-3) (Imp: HRS §397-3)

§12-235-3 Landing and runway enclosure. Inclined tunnel lifts used at any time for carrying people other than employees trained in their use and inspectors shall have the landings and runways enclosed as required by sections 12-234-5 and 6. [Eff. 12/19/83; ren §12-235-3 and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-235-4 Machine room. (a) Safe and convenient access shall be provided to machine rooms of inclined tunnel lifts.

(b) Machine rooms shall be substantially constructed to protect equipment from the weather. They shall be secured against unauthorized access.

(c) A minimum head room of 7 feet (2.1 m) shall be maintained in machine rooms.

(d) Machine room illumination shall be not less than 10 foot-candles at floor level in all working areas.

(e) Machine enclosure shall provide a minimum of 12 inches (30 cm) horizontal or vertical clearances or more if necessary to give access to parts of the machinery that may require maintenance. [Eff. 12/19/83; am and ren §12-235-4 and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-235-5 Machine supports and safety factors. (a) Machinery and sheaves shall be so supported and held as to prevent any part becoming displaced.

(b) The safety factor for machine beams and their immediate supporting beams shall be 5 for steel and 7 for reinforced concrete. [Eff. 12/19/83; ren §12-235-5 and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-235-6 Landing doors or gates. At each landing area of an inclined tunnel lift, the opening providing access and egress to and from the car shall be protected by a door or a gate. Landing doors, if used, shall be as required by section 12-234-11. Gates, if used, shall open outward (i.e., not swing into the runway) and shall be self-closing. Corners of gates shall be rounded, and shall meet the provisions of the safety requirements for standard handrails. [Eff. 12/19/83; ren §12-235-6 and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-235-7 Guide rails. (a) Guide rails for inclined tunnel lifts shall be rigidly fixed and supported in proper alignment to withstand the loads likely to be imposed upon them by the car when safeties are applied.

(b) Guide rails shall be constructed of metal. [Eff. 12/19/83; ren §12-235-7 and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-235-8 Car and car enclosure. (a) Inclined tunnel lift cars shall have metal frames and metal outside frames or platforms designed for the load to be imposed thereon in accordance with the criteria in section 203 of ANSI/ASME A17.1.

(b) Cars shall be enclosed on the sides with solid or perforated materials to a height of 42 inches (105 cm). If perforated materials are used, the opening shall reject a ball 3/4 inch (1.9 cm) in diameter. This

shall not apply to cars which have seats and restraining harness for each passenger.

(c) Car enclosure shall be metal, wood, or other suitable material capable of safely withstanding any load or pressure to which it may be subjected.

(d) Each entrance to an inclined tunnel lift car shall be provided with a door or gate covering the full width and height of the opening.

(e) Car doors or gates may be solid or have openings that will reject a ball 3/4 inch (1.9 cm) in diameter.

(f) A capacity plate shall be installed on the inside of the car. This sign shall be in letters not less than 1/4 inch (0.6 cm) in height stating:

(1) The maximum number of persons allowed to ride at one time.

(2) The maximum load in pounds that the car is designed to carry.

[Eff. 12/19/83; am and ren §12-235-8 and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-235-9 Safeties and safety devices. (a) Every inclined tunnel lift shall have a car safety that shall be applied automatically when a governor driven by the movement of the car exceeds a predetermined maximum speed.

(b) Instantaneous or gradual stopping safeties, types A, B, or C as permitted for elevators or equivalent, shall be used.

(c) The car safety shall be capable of stopping and sustaining the car with the full-rated load within the limits of stopping distances permitted for elevators of same speed and type of safety, as required to section 205 of ASME A17.1. [Eff. 12/19/83; ren §12-235-9 and comp 12/6/90; am 7/6/98] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-235-10 Car speed governors. (a) The car speed governor shall be set to cause the application of the safety at a speed not more than 40 per cent and not less than 15 per cent above the design speed of the car.

(b) Car speed governors shall be equipped with a data plate specifying the manufacturer, the rated tripping speed, and the design speed of the lift. [Eff. 12/19/83; ren §12-235-10 and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-235-11 Machines. (a) Drums and sheaves shall be of cast iron or steel and shall have finished grooves which may be faced with material other than iron or steel having sufficient traction.

(b) The radius of U-grooves shall be approximately 1/32 inch (1.6 mm) larger than the radius of the ropes.

(c) The diameter of sheaves or drums for hoisting ropes should be 40 times and shall not be less than 20 times the diameter of the ropes used.

(d) Drums shall be designed so that successive layers of rope shall wind evenly on the drum without manual assistance.

(e) The safety factor based on static loads to be used in the design of inclined lift hoisting machines shall be at least 8 for wrought iron or wrought steel and 10 for cast iron, cast steel, or other materials.

(f) Set-screw fastenings shall not be used instead of keys or pins except when the connection is not subject to torque.

(g) The use of friction gearing or friction clutch mechanisms for connecting drums or sheaves to the main driving gear is prohibited.

(h) The installation of belt or chain driven machines to drive an inclined tunnel lift is prohibited.

(i) The use of worm gearing with cast iron teeth or the use of cast iron pinion or spur gearing in prohibited.

(j) Automatic inclined tunnel lift machines shall be equipped with electrically released brakes capable of stopping and holding the car with its full-rated load. Manually operated machines shall be equipped with either electrically released brakes or manually applied brakes capable of stopping and holding the car with its full-rated load.

(k) Electrically released brakes shall be applied automatically by springs or gravity when the operating device is at the "stop" position.

(l) Electrically operated brakes shall not be released until power has been applied. [Eff. 12/19/83; am and ren §12-235-11 and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-235-12 Terminal stopping devices. Automatic inclined tunnel lifts shall be equipped with:

(1) Normal limit switches to automatically stop the car at the upper and lower terminals;

(2) A final limit switch at the lower terminal complying with Rule 209.3a of ASME A17.1; and

(3) A stop motion switch on the machine complying with Rule 209.3d of ASME A17.1 or a slack cable switch complying with Rule 210.2a of ASME A17.1. [Eff. 12/19/83; ren §12-235-12 and comp 12/6/90; am 7/6/98] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-235-13 Operation and control. (a) Every automatic inclined tunnel lift shall be provided with a stopping device which can be operated from the car for the full length of the car's travel. This device, when operated, shall cut off power to the driving machine and set the brake and must be manually reset before the lift can again be operated.

(b) Every manually operated inclined tunnel lift shall be provided with a signal device which can be operated from the car for the full length of the car's travel and signal the hoist operator to stop the machine and set the brake.

(c) Every inclined tunnel lift shall be provided with a stop switch at the lowest terminal landing that must be manually reset before the lift can be operated. [Eff. 12/19/83; ren §12-235-13 and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-235-14 Speed limits. The operating speed for inclined tunnel lifts shall not exceed 200 feet (60.6 m) per minute. [Eff. 12/19/83; am and ren §12-235-14 and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-235-15 Ropes. (a) The safety factor of car hoisting ropes based on static loads for car and rated load shall be at least 7.

(b) A hoisting rope less than 1/2-inch (1.2 cm) diameter shall not be used.

(c) The repair or lengthening of a car hoisting rope by splicing is prohibited.

(d) All ropes anchored to a winding drum shall have not less than 1-1/2 turns of rope on the drum when the car has reached the extreme limit of

its travel.

(e) When the ropes are fastened inside a winding drum, they shall pass around the shaft before being fastened, or be fastened to a clevis passing around the shaft in cases where the shaft revolves in an opposite direction to the drum. The ends of ropes shall be secured by clips or by individual tapered babbitted sockets.

(f) Ropes shall be inspected and replaced when necessary as required by Item 103.4 of ASME A17.2. [Eff. 12/19/83; am and ren §12-235-15 and comp 12/6/90; am 7/6/98] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-235-16 Fastening car end of rope. (a) The car end of the hoisting rope shall be fastened by individual tapered babbitted sockets or by clip fastenings. Sockets and the method of babbitting shall comply with Rule 212.9 of ANSI/ASME A17.1.

(b) If socketed rope fastenings are used, adjustable shackle rods shall be provided to attach ropes to cars in such a manner that all portions of the rope except the portion in the socket shall be readily visible. Socketed fastenings shall be resocketed annually.

(c) The clips used shall be of the Crosby type or equal, with double saddles grooved to suit ropes used, and shall have drop forged bolts.

(d) A minimum of four clips shall be used for all applications. Clips shall be spaced at intervals not less than 4 times the diameter of the wire.

(e) An auxiliary rope fastening device shall be provided when a single hoisting rope is permitted. [Eff. 12/19/83; ren §12-235-16 and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-235-17 Rope tags. Every person installing a hoisting, car safety, or governor rope shall provide a metal or plastic tag legibly showing the date of installation, the grade of material, the diameter, the ultimate strength and notice that the rope is preformed or non-preformed. The tags shall be attached to the hoisting ropes at the car, to the static safety ropes at the anchor, and on the governor for rope-driven governors. [Eff. 12/19/83; ren §12-235-17 and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-235-18 Buffers. (a) Spring buffers shall be provided for the car at the lower end of the runway.

(b) Buffers shall be mounted on substantial supports and shall withstand without damage the impact of the fully loaded car at contract speed. [Eff. 12/19/83; ren §12-235-18 and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-235-19 Electrical equipment. The installation of all electrical equipment used in connection with an inclined tunnel lift shall comply with the requirements of NFPA 70. [Eff. 12/19/83; ren §12-235-19 and comp 12/6/90; am 7/6/98] (Auth: HRS §397-4) (Imp: HRS §397-4)

§12-235-20 Maintenance. (a) Owners of inclined tunnel lifts shall be responsible for maintaining their equipment in safe operating condition at all times.

(b) Owners shall maintain a record of inspections and maintenance. These records shall be available to the department for at least 36 months.

(c) When an inspector discovers an unsafe condition in connection with

an inclined tunnel lift that is not specifically addressed in this chapter, the inspector shall issue an order requiring the owner to make changes, improvements, or repairs as may be necessary to remove hazards to persons or reduce the possibility of accidents. [Eff. 12/19/83; am and ren §12-235-20 and comp 12/6/90] (Auth: HRS §397-4) (Imp: HRS §397-4)